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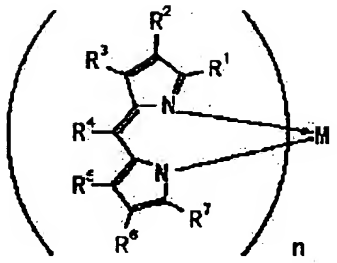
## (54) ORGANIC ELECTROLUMINESCENT ELEMENT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an organic electroluminescent element with high brightness.
SOLUTION: As a component material for an organic electroluminescent element, a specific pyrromethene metallic complex compound represented in a formula is used. In the formula, M represents an n valence metal ion; n is any one of 1, 2 and 3. R1 to R7 respectively independently express a hydrogen atom, a halogen atom, a hydroxyl group, a substituted or non-substituted amino group, a nitro group, a cyano group, a substituted or non-substituted alkyl group, a substituted or non-substituted alkenyl group, a substituted or non- substituted cycloalkyl group, a substituted or non-substituted alkoxy group, a substituted or non-substituted aromatic hydrocarbon group, a substituted or non-substituted aromatic heterocyclic group, a substituted or non-substituted aralkyl group, a substituted or non-substituted aryloxy group, a substituted or non-substituted alkoxycarbonyl group, and a carboxyl group. R1 to R7 may form a ring with two thereof.

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* NOTICES *



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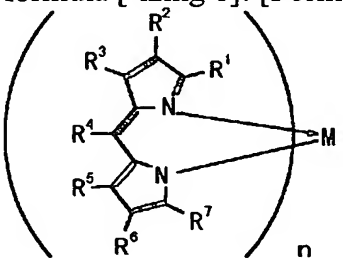
## CLAIMS

[Claim(s)]
[Claim 1] the organic electroluminescent element which has the monostromatic or the two or more layers organic thin film layer which contains a luminous layer between cathode and an anode plate -- setting -- the aforementioned organic thin film layer -- at least -- much more -- alike -- general formula [-izing 1]: [Formula 1]




(M expresses the metal ion of n ** among a chemical formula.) Independently R1-R7, respectively A hydrogen atom, a halogen atom, a hydroxyl, The alkyl group which is not replaced [ the amino group which is not replaced / substitution or /, a nitro group, a cyano group, substitution, or ], The cycloalkyl machine which is not replaced [ the ARUKENIRU machine which is not replaced / substitution or /, substitution, or ], The aromatic-hydrocarbon machine which is not replaced [ the alkoxy group which is not replaced / substitution or /, substitution or ], The alkoxy carbonyl group which is not replaced [ the aryloxy group which is not replaced / the aralkyl machine which is not replaced / the aromatic heterocycle machine which is not replaced / substitution or /, substitution, or /, substitution, or /, substitution, or ] and a carboxyl group are expressed. Moreover, R1-R7 may form the ring by two of them. n is 1, 2, or 3. Organic electroluminescent element characterized for the PIROMETEN metal complex compound shown by independent or containing with mixture.
[Claim 2] The aforementioned organic thin film layer is independent or organic electroluminescent element according to claim 1 characterized by containing as mixture about the compound which has the aforementioned luminous layer and is expressed with the aforementioned general formula [-izing 1] to the aforementioned luminous layer.
[Claim 3] The aforementioned organic thin film layer is independent or organic electroluminescent element according to claim 1 characterized by containing as mixture about the compound which has an electron hole transporting bed containing electron hole transportation material, and is expressed with the aforementioned general formula [-izing 1] to the aforementioned electron hole transporting bed.
[Claim 4] The aforementioned organic thin film layer is independent or organic electroluminescent element according to claim 1 characterized by containing as mixture about the compound which has an electronic transporting bed containing electronic transportation material, and is expressed with the aforementioned general formula [-izing 1] to the aforementioned electronic transporting bed.

[Translation done.]

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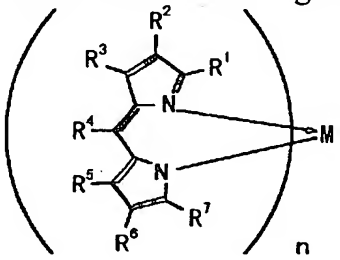
## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the organic electroluminescent element excellent in the luminescence property.
[0002]
[Description of the Prior Art] An organic electroluminescence (EL) element is a spontaneous light-corpuscle child using the principle in which the fluorescence nature matter emits light by the recombination energy of the electron hole poured in from the anode plate, and the electron poured in from cathode by impressing electric field.
[0003] Since the report (C. W.Tang, S.A.VanSlyke, applied physics Letters (Applied Physics Letters), 51 volumes, 913 pages, 1987 , etc.) of the low-battery drive organic EL element by the laminating type element by C.W.Tang and others of Eastman Kodak Co. was made, research on the organic EL element which makes an organic material a component has been done briskly.
[0004] Tang and others uses tris (8-hydroxy quinolinol aluminum) for the luminous layer, and it uses the triphenyl diamine derivative for the electron hole transporting bed. As an advantage of a laminated structure, raising the injection efficiency of the electron hole to a luminous layer, raising the generation efficiency of the exciton which blocks the electron poured in from cathode and is generated by reunion, shutting up the exciton generated within the luminous layer, etc. are mentioned.
[0005] As element structure of an organic EL element, the three-layer type of the two-layer type of an electron hole transportation (pouring) layer and an electronic transportability luminous layer or an electron hole transportation (pouring) layer, a luminous layer, and an electronic transportation (pouring) layer etc. is well known like this example.
[0006] In such a laminating type constituent child, in order to raise the poured-in recombination efficiency of an electron hole and an electron, the device of element structure or the formation method is made.
[0007] They are the 4,4',4"-tris(3-methylphenylphenylamino)triphenylamine which is a starburst molecule as an electron hole transportability material, and N and N'-diphenyl. - Triphenylamine derivatives and aromatic diamine derivatives, such as an N, N'-screw (3-methylphenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine, are known well (for example, JP,8-20771,A, JP,8-40995,A, JP,8-40997,A, the official report publication-number No. 543397 [ eight to ] official report, JP,8-87122,A, etc.).
[0008] As an electronic transportability material, the OKISA diazole derivative, the triazole derivative, etc. are known well.
[0009] Moreover, as a luminescent material, luminescent material, such as chelate complexes, such as a tris (8-quinolinolato) aluminum complex, a coumarin derivative, a tetrapod phenyl butadiene derivative, a screw styryl arylene derivative, and an OKISA diazole derivative, is known, it is reported that luminescence of the visible region to blue shell red is obtained also for those luminescent color, and realization of a color display element is expected (for example, JP,8-239655,A, JP,7-138561,A, JP,3-200289,A, etc.).
[0010] Moreover, PIROMETEN-BF2 complex is indicated by JP,9-289081,A as a luminescent material.

[0011]
[Problem(s) to be Solved by the Invention] Although high brightness and the long lasting organic EL element are indicated or reported by recently, it cannot still necessarily be said as sufficient thing. Therefore, the material development which shows high performance is called for strongly. The purpose of this invention is to offer the organic EL element of high brightness.
[0012]
[Means for Solving the Problem] In order that this invention persons may solve the aforementioned technical problem, as a result of inquiring wholeheartedly, it found out that the organic EL element produced using a specific PIROMETEN metal complex compound as a luminescent material carried out high brightness luminescence conventionally.
[0013] Moreover, as for the aforementioned material, it turns out that it has high carrier transportability, and the organic EL element produced using the mixed thin film with the organic EL element which produced the aforementioned material as electron hole transportation material or an electronic transportation material and the aforementioned material and other electron hole transportation material, or electronic transportation material found out that high brightness luminescence was shown conventionally, and resulted in this invention.
[0014] namely, the organic electroluminescent element which has the monostromatic or the two or more layers organic thin film layer in which this invention contains a luminous layer between cathode and an anode plate -- setting -- the aforementioned organic thin film layer -- at least -- much more -- alike -- general formula [-izing 2]: -- [Formula 2]




(M expresses the metal ion of n ** among a formula.) n is 1, 2, or 3. Independently R1-R7, respectively A hydrogen atom, a halogen atom, a hydroxyl, The alkyl group which is not replaced [ the amino group which is not replaced / substitution or /, a nitro group, a cyano group, substitution, or ], The cycloalkyl machine which is not replaced [ the alkenyl machine which is not replaced / substitution or /, substitution, or ], The aromatic-hydrocarbon machine which is not replaced [ the alkoxy group which is not replaced / substitution or /, substitution or ], The alkoxy carbonyl group which is not replaced [ the aryloxy group which is not replaced / the aralkyl machine which is not replaced / the aromatic heterocycle machine which is not replaced / substitution or /, substitution, or /, substitution, or /, substitution, or ] and a carboxyl group are expressed. Moreover, R1-R7 may form the ring by two of them. They are independent or the organic electroluminescent element characterized by containing with mixture about the PIROMETEN metal complex compound shown.
[0015] Moreover, this invention has a luminous layer at least as the aforementioned organic thin film layer, and is independent or organic electroluminescent element characterized by containing as mixture about the compound by which this luminous layer is expressed with a general formula [-izing 2].
[0016] Moreover, this invention has an electron hole transporting bed at least as the aforementioned organic thin film layer, and is independent or organic electroluminescent element characterized by containing as mixture about the compound by which this luminous layer is expressed with a general formula [-izing 2].
[0017] Moreover, this invention has an electronic transporting bed at least as the aforementioned organic thin film layer, and is independent or organic electroluminescent element characterized by containing as mixture about the compound by which this luminous layer is expressed with a general formula [-izing 2].
[0018]

[Embodiments of the Invention] Hereafter, this invention is explained in detail. The compound in connection with this invention is a compound which has the structure expressed with a general formula [-izing 2]. (M expresses the metal ion of n ** among a formula.) n consists of 1, 2, or 3. Independently R1-R7, respectively A hydrogen atom, a halogen atom, a hydroxyl, The alkyl group which is not replaced [ the amino group which is not replaced / substitution or /, a nitro group, a cyano group, substitution, or ], The cycloalkyl machine which is not replaced [ the ARUKENIRU machine which is not replaced / substitution or /, substitution, or ], The aromatic-hydrocarbon machine which is not replaced [ the alkoxy group which is not replaced / substitution or /, substitution or ], The alkoxy carbonyl group which is not replaced [ the aryloxy group which is not replaced / the aralkyl machine which is not replaced / the aromatic heterocycle machine which is not replaced / substitution or /, substitution, or /, substitution, or /, substitution, or ] and a carboxyl group are expressed. Moreover, R1-R7 may form the ring by two of them.

[0019] As a metal which can be used for M which shows the metal ion of n ** Aluminum, beryllium, a bismuth, cadmium, a cerium, cobalt, Copper, iron, a gallium, germanium, mercury, an indium, a lanthanum, magnesium, Molybdenum, niobium, antimony, a scandium, tin, a tantalum, Thorium, titanium, uranium, a tungsten, a zirconium, vanadium, Although zinc, silver, gold, platinum, chromium, manganese, an yttrium, nickel, palladium, lead, a selenium, a tellurium, a thallium, calcium, strontium, barium, neodium, europium, and an erbium are mentioned, it is not restricted to these.

[0020] Independently R1-R7, respectively A hydrogen atom, a halogen atom, a hydroxyl, The alkyl group which is not replaced [ the amino group which is not replaced / substitution or /, a nitro group, a cyano group, substitution, or ], The cycloalkyl machine which is not replaced [ the ARUKENIRU machine which is not replaced / substitution or /, substitution, or ], The aromatic-hydrocarbon machine which is not replaced [ the alkoxy group which is not replaced / substitution or /, substitution or ], The alkoxy carbonyl group which is not replaced [ the aryloxy group which is not replaced / the aralkyl machine which is not replaced / the aromatic heterocycle machine which is not replaced / substitution or /, substitution, or /, substitution, or /, substitution, or ] and a carboxyl group are expressed. Moreover, R1-R7 may form the ring by two of them.

[0021] A fluorine, chlorine, a bromine, and iodine are mentioned as a halogen atom.

[0022] the amino group which is not replaced [ substitution or ] is expressed as -NX 1X2 -- independently as X1 and X2, respectively A hydrogen atom, a methyl group, an ethyl group, a propyl group, an isopropyl machine, n-butyl, s-butyl, an isobutyl machine, t-butyl, n-pentyl machine, n-hexyl machine, n-heptyl machine, n-octyl machine, a hydroxymethyl group, 1-hydroxyethyl machine, 2-hydroxyethyl machine, a 2-hydroxy isobutyl machine, 1, 2-dihydroxyethyl machine, 1, 3-dihydroxy isopropyl machine, 2, a 3-dihydroxy-t-butyl, 1, 2, 3-trihydroxy propyl group, a chloro methyl group, 1-chloro ethyl group, 2-chloro ethyl group, 2-chloro isobutyl machine, 1, 2-dichloro ethyl group, 1, 3-dichloro isopropyl machine, 2, a 3-dichloro-t-butyl, 1, 2, 3-TORIKURORO propyl group, a bromomethyl machine, 1-BUROMO ethyl group, 2-BUROMO ethyl group, 2-BUROMO isobutyl machine, 1, 2-dibromo ethyl group, 1, 3-dibromo isopropyl machine, 2, a 3-dibromo t-butyl, 1, 2, 3-TORIBUROMO propyl group, an iodine methyl group, 1-iodine ethyl group, 2-iodine ethyl group, 2-iodine isobutyl machine, 1, 2-diiodo ethyl group, 1, 3-diiodo isopropyl machine, 2, a 3-diiodo t-butyl, 1, 2, 3-triiodo propyl group, an aminomethyl machine, 1-aminoethyl machine, 2-aminoethyl machine, a 2-amino isobutyl machine, 1, 2-diamino ethyl group, 1, 3-diamino isopropyl machine, 2, a 3-diamino t-butyl, 1, 2, 3-triamino propyl group, a cyano methyl group, 1-cyano ethyl group, 2-cyano ethyl group, 2-cyano isobutyl machine, 1, 2-dicyano ethyl group, 1, 3-dicyano isopropyl machine, 2, a 3-dicyano t-butyl, 1, 2, 3-tricyanopropyl machine, a nitro methyl group, 1-nitroglycerine ethyl group, 2-nitroglycerine ethyl group, 2-nitroglycerine isobutyl machine, 1, 2-dinitro ethyl group, 1, 3-dinitro isopropyl machine, 2, a 3-dinitro t-butyl, 1, 2, a 3-trinitro propyl group, a phenyl group, 1-naphthyl group, 2-naphthyl group, 1-anthryl machine, 2-anthryl machine, 9-anthryl machine, 1-phenan tolyl group, 2-phenan tolyl group, 3-phenan tolyl group, 4-phenan tolyl group, 9-phenan tolyl group, 1-naphtha SENIRU machine, 2-naphtha SENIRU machine, 9-naphtha SENIRU machine, 4-styryl phenyl group, 1-pyrenyl machine, 2-pyrenyl machine, 4-pyrenyl machine, 2-

biphenylyl machine, 3-biphenylyl machine, 4-biphenylyl machine, a p-terphenyl-4-IRU machine, A p-terphenyl-3-IRU machine, a p-terphenyl-2-IRU machine, an m-terphenyl-4-IRU machine, An m-terphenyl-3-IRU machine, an m-terphenyl-2-IRU machine, o-tolyl group, m-tolyl group, p-tolyl group, a p-t-butylphenyl group, p-(2-phenylpropyl) phenyl group, A 3-methyl-2-naphthyl group, a 4-methyl-1-naphthyl group, a 4-methyl-1-anthryl machine, A 4'-methyl biphenylyl machine, 4" - t-butyl-p-terphenyl-4-IRU machine, 2-pyrrolyl machine, 3-pyrrolyl machine, a pyrazinyl machine, 2-pyridinyl group, 3-pyridinyl group, 4-pyridinyl group, 2-indolyl machine, 3-indolyl machine, 4-indolyl machine, 5-indolyl machine, 6-indolyl machine, 7-indolyl machine, A 1-iso indolyl machine, a 3-iso indolyl machine, a 4-iso indolyl machine, A 5-iso indolyl machine, a 6-iso indolyl machine, a 7-iso indolyl machine, 2-furil machine, 3-furil machine, a 2-benzofuranyl machine, a 3-benzofuranyl machine, A 4-benzofuranyl machine, a 5-benzofuranyl machine, a 6-benzofuranyl machine, A 7-benzofuranyl machine, a 1-iso benzofuranyl machine, a 3-iso benzofuranyl machine, A 4-iso benzofuranyl machine, a 5-iso benzofuranyl machine, a 6-iso benzofuranyl machine, A 7-iso benzofuranyl machine, 2-quinolyl machine, 3-quinolyl machine, 4-quinolyl machine, 5-quinolyl machine, 6-quinolyl machine, 7-quinolyl machine, 8-quinolyl machine, A 1-iso quinolyl machine, a 3-iso quinolyl machine, a 4-iso quinolyl machine, a 5-iso quinolyl machine, A 6-iso quinolyl machine, a 7-iso quinolyl machine, a 8-iso quinolyl machine, 2-kino KISARINIRU machine, 5-kino KISARINIRU machine, 6-kino KISARINIRU machine, 1-carbazolyl machine, 2-carbazolyl machine, 3-carbazolyl machine, 4-carbazolyl machine, 1-phenanthridinyl machine, 2-phenanthridinyl machine, 3-phenanthridinyl machine, 4-phenanthridinyl machine, 6-phenanthridinyl machine, 7-phenanthridinyl machine, 8-phenanthridinyl machine, 9-phenanthridinyl machine, 10-phenanthridinyl machine, 1-acridinyl machine, 2-acridinyl machine, 3-acridinyl machine, 4-acridinyl machine, 9-acridinyl machine, 1, a 7-phenan SURORIN-2-IRU machine, 1, a 7-phenan SURORIN-3-IRU machine, 1, a 7-phenan SURORIN-4-IRU machine, 1, a 7-phenan SURORIN-5-IRU machine, 1, a 7-phenan SURORIN-6-IRU machine, 1, a 7-phenan SURORIN-8-IRU machine, 1, a 7-phenan SURORIN-9-IRU machine, 1, a 7-phenan SURORIN-10-IRU machine, 1, a 8-phenan SURORIN-2-IRU machine, 1, a 8-phenan SURORIN-3-IRU machine, 1, a 8-phenan SURORIN-4-IRU machine, 1, a 8-phenan SURORIN-5-IRU machine, 1, a 8-phenan SURORIN-6-IRU machine, 1, a 8-phenan SURORIN-7-IRU machine, 1, a 8-phenan SURORIN-9-IRU machine, 1, a 8-phenan SURORIN-10-IRU machine, 1, a 9-phenan SURORIN-2-IRU machine, 1, a 9-phenan SURORIN-3-IRU machine, 1, a 9-phenan SURORIN-4-IRU machine, 1, a 9-phenan SURORIN-5-IRU machine, 1, a 9-phenan SURORIN-6-IRU machine, 1, a 9-phenan SURORIN-7-IRU machine, 1, a 9-phenan SURORIN-8-IRU machine, 1, a 9-phenan SURORIN-10-IRU machine, 1, 10-phenan SURORIN -2 - IRU Machine, 1, 10-Phenan SURORIN-3-IRU Machine, 1, 10-Phenan SURORIN-4-IRU Machine, 1, a 10-phenan SURORIN-5-IRU machine, 2, a 9-phenan SURORIN-1-IRU machine, 2, a 9-phenan SURORIN-3-IRU machine, 2, a 9-phenan SURORIN-4-IRU machine, 2, a 9-phenan SURORIN-5-IRU machine, 2, a 9-phenan SURORIN-6-IRU machine, 2, a 9-phenan SURORIN-7-IRU machine, 2, a 9-phenan SURORIN-8-IRU machine, 2, a 9-phenan SURORIN-10-IRU machine, 2, a 8-phenan SURORIN-1-IRU machine, 2, a 8-phenan SURORIN-3-IRU machine, 2, a 8-phenan SURORIN-4-IRU machine, 2, a 8-phenan SURORIN-5-IRU machine, 2, a 8-phenan SURORIN-6-IRU machine, 2, a 8-phenan SURORIN-7-IRU machine, 2, a 8-phenan SURORIN-9-IRU machine, 2, a 8-phenan SURORIN-10-IRU machine, 2, a 7-phenan SURORIN-1-IRU machine, 2, a 7-phenan SURORIN-3-IRU machine, 2, a 7-phenan SURORIN-4-IRU machine, 2, a 7-phenan SURORIN-5-IRU machine, 2, a 7-phenan SURORIN-6-IRU machine, 2, a 7-phenan SURORIN-8-IRU machine, 2, a 7-phenan SURORIN-9-IRU machine, 2, a 7-phenan SURORIN-10-IRU machine, 1-FENAJINIRU machine, 2-FENAJINIRU machine, 1-phenothiazinyl group, 2-phenothiazinyl group, 3-phenothiazinyl group, 4-phenothiazinyl group, 1-phenoxazinyl machine, 2-phenoxazinyl machine, 3-phenoxazinyl machine, 4-phenoxazinyl machine, 2-oxazolyl machine, 4-oxazolyl machine, 5-oxazolyl machine, 2-oxadiazolyl machine, 5-oxadiazolyl machine, 3-furazanyl group, 2-thienyl group, 3-thienyl group, A 2-methyl pyrrole-1-IRU machine, a 2-methyl pyrrole-3-IRU machine, A 2-methyl pyrrole-4-IRU machine, a 2-methyl pyrrole-5-IRU machine, A 3-methyl pyrrole-1-IRU machine, a 3-methyl pyrrole-2-IRU machine, A 3-methyl pyrrole-4-IRU machine, a 3-methyl

pyrrole-5-IRU machine, A 2-t-butyl pyrrole-4-IRU machine, a 3-(2-phenylpropyl) pyrrole-1-IRU machine, A 2-methyl-1-indolyl machine, a 4-methyl-1-indolyl machine, a 2-methyl-3-indolyl machine, A 4-methyl-3-indolyl machine, a 2-t-butyl 1-indolyl machine, a 4-t-butyl 1-indolyl machine, a 2-t-butyl 3-indolyl machine, a 4-t-butyl 3-indolyl machine, etc. are mentioned.
[0023] As an alkyl group which is not replaced [ substitution or ], a methyl group, an ethyl group, a propyl group, An isopropyl machine, n-butyl, s-butyl, an isobutyl machine, t-butyl, n-pentyl machine, n-hexyl machine, n-heptyl machine, n-octyl machine, A hydroxymethyl group, 1-hydroxyethyl machine, 2-hydroxyethyl machine, A 2-hydroxy isobutyl machine, 1, 2-dihydroxyethyl machine, 1, 3-dihydroxy isopropyl machine, 2, a 3-dihydroxy-t-butyl, 1 and 2, 3-trihydroxy propyl group, A chloro methyl group, 1-chloro ethyl group, 2-chloro ethyl group, 2-chloro isobutyl machine, 1, 2-dichloro ethyl group, 1, 3-dichloro isopropyl machine, 2, a 3-dichloro-t-butyl, 1, 2, 3-TORIKURORO propyl group, a bromomethyl machine, 1-BUROMO ethyl group, 2-BUROMO ethyl group, 2-BUROMO isobutyl machine, 1, 2-dibromo ethyl group, 1, 3-dibromo isopropyl machine, 2, a 3-dibromo t-butyl, 1, 2, 3-TORIBUROMO propyl group, an iodine methyl group, 1-iodine ethyl group, 2-iodine ethyl group, 2-iodine isobutyl machine, 1, 2-diiodo ethyl group, 1, 3-diiodo isopropyl machine, 2, a 3-diiodo t-butyl, 1, 2, 3-triiodo propyl group, an aminomethyl machine, 1-aminoethyl machine, 2-aminoethyl machine, a 2-amino isobutyl machine, 1, 2-diamino ethyl group, 1, 3-diamino isopropyl machine, 2, a 3-diamino t-butyl, 1, 2, 3-triamino propyl group, a cyano methyl group, 1-cyano ethyl group, 2-cyano ethyl group, 2-cyano isobutyl machine, 1, 2-dicyano ethyl group, 1, 3-dicyano isopropyl machine, 2, a 3-dicyano t-butyl, 1, 2, 3-tricyanopropyl machine, a nitro methyl group, 1-nitroglycerine ethyl group, 2-nitroglycerine ethyl group, 2-nitroglycerine isobutyl machine, 1, 2-dinitro ethyl group, 1, 3-dinitro isopropyl machine, 2, a 3-dinitro t-butyl, 1 and 2, a 3-trinitro propyl group, etc. are mentioned.
[0024] As an ARUKENIRU machine which is not replaced [ substitution or ] A vinyl group, an allyl group, 1-butenyl group, 2-butenyl group, 3-butenyl group, 1, 3-butane dienyl machine, 1-methyl vinyl-group, styryl machine, 2, and 2-diphenyl vinyl group, 1, 2-diphenyl vinyl-group, 1-methyl allyl group, 1, and 1-dimethyl allyl group, 2-methyl allyl group, 1-phenyl allyl group, 2-phenyl allyl group, 3-phenyl allyl group, 3, and 3-diphenyl allyl group, 1, 2-dimethyl allyl group, a 1-phenyl-1-butenyl group, a 3-phenyl-1-butenyl group, etc. are mentioned.
[0025] As a cycloalkyl machine which is not replaced [ substitution or ], a cyclo propyl group, a cyclo butyl, a cyclopentylic group, a cyclohexyl machine, 4-methyl cyclohexyl machine, etc. are mentioned. The alkoxy group which is not replaced [ substitution or ] is a basis expressed with -OY. as Y A methyl group, an ethyl group, a propyl group, an isopropyl machine, n-butyl, s-butyl, an isobutyl machine, t-butyl, n-pentyl machine, n-hexyl machine, n-heptyl machine, n-octyl machine, a hydroxymethyl group, 1-hydroxyethyl machine, 2-hydroxyethyl machine, a 2-hydroxy isobutyl machine, 1, 2-dihydroxyethyl machine, 1, 3-dihydroxy isopropyl machine, 2, a 3-dihydroxy-t-butyl, 1, 2, 3-trihydroxy propyl group, a chloro methyl group, 1-chloro ethyl group, 2-chloro ethyl group, 2-chloro isobutyl machine, 1, 2-dichloro ethyl group, 1, 3-dichloro isopropyl machine, 2, a 3-dichloro-t-butyl, 1, 2, 3-TORIKURORO propyl group, a bromomethyl machine, 1-BUROMO ethyl group, 2-BUROMO ethyl group, 2-BUROMO isobutyl machine, 1, 2-dibromo ethyl group, 1, 3-dibromo isopropyl machine, 2, a 3-dibromo t-butyl, 1, 2, 3-TORIBUROMO propyl group, an iodine methyl group, 1-iodine ethyl group, 2-iodine ethyl group, 2-iodine isobutyl machine, 1, 2-diiodo ethyl group, 1, 3-diiodo isopropyl machine, 2, a 3-diiodo t-butyl, 1, 2, 3-triiodo propyl group, an aminomethyl machine, 1-aminoethyl machine, 2-aminoethyl machine, a 2-amino isobutyl machine, 1, 2-diamino ethyl group, 1, 3-diamino isopropyl machine, 2, a 3-diamino t-butyl, 1, 2, 3-triamino propyl group, a cyano methyl group, 1-cyano ethyl group, 2-cyano ethyl group, 2-cyano isobutyl machine, 1, 2-dicyano ethyl group, 1, 3-dicyano isopropyl machine, 2, a 3-dicyano t-butyl, 1, 2, 3-tricyanopropyl machine, a nitro methyl group, 1-nitroglycerine ethyl group, 2-nitroglycerine ethyl group, 2-nitroglycerine isobutyl machine, 1, 2-dinitro ethyl group, 1, 3-dinitro isopropyl machine, 2, a 3-dinitro t-butyl, 1 and 2, a 3-trinitro propyl group, etc. are mentioned.
[0026] As an example of the aromatic-hydrocarbon machine which is not replaced [ substitution

or ] A phenyl group, 1-naphthyl group, 2-naphthyl group, 1-anthryl machine, 2-anthryl machine, 9-anthryl machine, 1-phenan tolyl group, 2-phenan tolyl group, 3-phenan tolyl group, 4-phenan tolyl group, 9-phenan tolyl group, 1-naphtha SENIRU machine, 2-naphtha SENIRU machine, 9-naphtha SENIRU machine, 1-pyrenyl machine, 2-pyrenyl machine, 4-pyrenyl machine, 2-biphenylyl machine, 3-biphenylyl machine, 4-biphenylyl machine, a p-terphenyl-4-IRU machine, a p-terphenyl-3-IRU machine, A p-terphenyl-2-IRU machine, an m-terphenyl-4-IRU machine, an m-terphenyl-3-IRU machine, An m-terphenyl-2-IRU machine, o-tolyl group, m-tolyl group, p-tolyl group, A p-t-butylphenyl group, p-(2-phenylpropyl) phenyl group, A 3-methyl-2-naphthyl group, a 4-methyl-1-naphthyl group, a 4-methyl-1-anthryl machine, a 4'-methyl biphenylyl machine, 4" - A t-butyl-p-terphenyl-4-IRU machine etc. is mentioned.

[0027] As an aromatic heterocycle machine which is not replaced [ substitution or ], moreover, 1-pyrrolyl machine, 2-pyrrolyl machine, 3-pyrrolyl machine, a pyrazinyl machine, 2-pyridinyl group, 3-pyridinyl group, 4-pyridinyl group, 1-indolyl machine, 2-indolyl machine, 3-indolyl machine, 4-indolyl machine, 5-indolyl machine, 6-indolyl machine, 7-indolyl machine, a 1-iso indolyl machine, a 2-iso indolyl machine, A 3-iso indolyl machine, a 4-iso indolyl machine, a 5-iso indolyl machine, A 6-iso indolyl machine, a 7-iso indolyl machine, 2-furil machine, 3-furil machine, A 2-benzofuranyl machine, a 3-benzofuranyl machine, a 4-benzofuranyl machine, A 5-benzofuranyl machine, a 6-benzofuranyl machine, a 7-benzofuranyl machine, A 1-iso benzofuranyl machine, a 3-iso benzofuranyl machine, a 4-iso benzofuranyl machine, A 5-iso benzofuranyl machine, a 6-iso benzofuranyl machine, a 7-iso benzofuranyl machine, 2-quinolyl machine, 3-quinolyl machine, 4-quinolyl machine, 5-quinolyl machine, 6-quinolyl machine, 7-quinolyl machine, 8-quinolyl machine, a 1-iso quinolyl machine, A 3-iso quinolyl machine, a 4-iso quinolyl machine, a 5-iso quinolyl machine, a 6-iso quinolyl machine, A 7-iso quinolyl machine, a 8-iso quinolyl machine, 2-kino KISARINIRU machine, 5-kino KISARINIRU machine, 6-kino KISARINIRU machine, 1-carbazolyl machine, 2-carbazolyl machine, 3-carbazolyl machine, 4-carbazolyl machine, 9-carbazolyl machine, 1-phenanthridinyl machine, 2-phenanthridinyl machine, 3-phenanthridinyl machine, 4-phenanthridinyl machine, 6-phenanthridinyl machine, 7-phenanthridinyl machine, 8-phenanthridinyl machine, 9-phenanthridinyl machine, 10-phenanthridinyl machine, 1-acridinyl machine, 2-acridinyl machine, 3-acridinyl machine, 4-acridinyl machine, 9-acridinyl machine, 1, a 7-phenan SURORIN-2-IRU machine, 1, a 7-phenan SURORIN-3-IRU machine, 1, a 7-phenan SURORIN-4-IRU machine, 1, a 7-phenan SURORIN-5-IRU machine, 1, a 7-phenan SURORIN-6-IRU machine, 1, a 7-phenan SURORIN-8-IRU machine, 1, a 7-phenan SURORIN-9-IRU machine, 1, a 7-phenan SURORIN-10-IRU machine, 1, a 8-phenan SURORIN-2-IRU machine, 1, a 8-phenan SURORIN-3-IRU machine, 1, a 8-phenan SURORIN-4-IRU machine, 1, a 8-phenan SURORIN-5-IRU machine, 1, a 8-phenan SURORIN-6-IRU machine, 1, a 8-phenan SURORIN-7-IRU machine, 1, a 8-phenan SURORIN-9-IRU machine, 1, a 8-phenan SURORIN-10-IRU machine, 1, a 9-phenan SURORIN-2-IRU machine, 1, a 9-phenan SURORIN-3-IRU machine, 1, a 9-phenan SURORIN-4-IRU machine, 1, a 9-phenan SURORIN-5-IRU machine, 1, a 9-phenan SURORIN-6-IRU machine, 1, a 9-phenan SURORIN-7-IRU machine, 1, a 9-phenan SURORIN-8-IRU machine, 1, a 9-phenan SURORIN-10-IRU machine, 1, a 10-phenan SURORIN-2-IRU machine, 1, a 10-phenan SURORIN-3-IRU machine, 1, a 10-phenan SURORIN-4-IRU machine, 1, a 10-phenan SURORIN-5-IRU machine, 2, a 9-phenan SURORIN-1-IRU machine, 2, a 9-phenan SURORIN-3-IRU machine, 2, a 9-phenan SURORIN-4-IRU machine, 2, a 9-phenan SURORIN-5-IRU machine, 2, a 9-phenan SURORIN-6-IRU machine, 2, a 9-phenan SURORIN-7-IRU machine, 2, a 9-phenan SURORIN-8-IRU machine, 2, a 9-phenan SURORIN-10-IRU machine, 2, a 8-phenan SURORIN-1-IRU machine, 2, a 8-phenan SURORIN-3-IRU machine, 2, a 8-phenan SURORIN-4-IRU machine, 2, a 8-phenan SURORIN-5-IRU machine, 2, a 8-phenan SURORIN-6-IRU machine, 2, a 8-phenan SURORIN-7-IRU machine, 2, a 8-phenan SURORIN-9-IRU machine, 2, a 8-phenan SURORIN-10-IRU machine, 2, a 7-phenan SURORIN-1-IRU machine, 2, a 7-phenan SURORIN-3-IRU machine, 2, a 7-phenan SURORIN-4-IRU machine, 2, a 7-phenan SURORIN-5-IRU machine, 2, a 7-phenan SURORIN-6-IRU machine, 2, a 7-phenan SURORIN-8-IRU machine, 2, a 7-phenan SURORIN-9-IRU machine, 2, a 7-phenan SURORIN-10-IRU machine, 1-FENAJINIRU machine, 2-FENAJINIRU machine, 1-phenothiazinyl group, 2-

phenothiazinyl group, 3-phenothiazinyl group, 4-phenothiazinyl group, 10-phenothiazinyl group, 1-phenoxazinyl machine, 2-phenoxazinyl machine, 3-phenoxazinyl machine, 4-phenoxazinyl machine, 10-phenoxazinyl machine, 2-oxazolyl machine, 4-oxazolyl machine, 5-oxazolyl machine, 2-oxadiazolyl machine, 5-oxadiazolyl machine, 3-furazanyl group, 2-thienyl group, 3-thienyl group, A 2-methyl pyrrole-1-IRU machine, a 2-methyl pyrrole-3-IRU machine, A 2-methyl pyrrole-4-IRU machine, a 2-methyl pyrrole-5-IRU machine, A 3-methyl pyrrole-1-IRU machine, a 3-methyl pyrrole-2-IRU machine, A 3-methyl pyrrole-4-IRU machine, a 3-methyl pyrrole-5-IRU machine, A 2-t-butyl pyrrole-4-IRU machine, a 3-(2-phenylpropyl) pyrrole-1-IRU machine, A 2-methyl-1-indolyl machine, a 4-methyl-1-indolyl machine, a 2-methyl-3-indolyl machine, A 4-methyl-3-indolyl machine, a 2-t-butyl 1-indolyl machine, a 4-t-butyl 1-indolyl machine, a 2-t-butyl 3-indolyl machine, a 4-t-butyl 3-indolyl machine, etc. are mentioned.

[0028] As an aralkyl machine which is not replaced [ substitution or ] A benzyl, 1-phenylethyl machine, 2-phenylethyl machine, 1-phenyl isopropyl machine, 2-phenyl isopropyl machine, a phenyl-t-butyl, alpha-naphthyl methyl group, A 1-alpha-naphthyl ethyl group, a 2-alpha-naphthyl ethyl group, a 1-alpha-naphthyl isopropyl machine, A 2-alpha-naphthyl isopropyl machine, beta-naphthyl methyl group, a 1-beta-naphthyl ethyl group, A 2-beta-naphthyl ethyl group, a 1-beta-naphthyl isopropyl machine, a 2-beta-naphthyl isopropyl machine, 1-pyrrolyl methyl group, 2-(1-pyrrolyl) ethyl group, p-methyl benzyl, m-methyl benzyl, o-methyl benzyl, p-chloro benzyl, m-chloro benzyl, o-chloro benzyl, and p-BUROMO benzyl, m-BUROMO benzyl, o-BUROMO benzyl, and p-iodine benzyl, m-iodine benzyl, o-iodine benzyl, a p-hydroxy benzyl, An m-hydroxy benzyl, an o-hydroxy benzyl, and a p-amino benzyl, An m-amino benzyl, an o-amino benzyl, and p-nitrobenzyl machine, m-nitrobenzyl machine, o-nitrobenzyl machine, p-cyano benzyl, m-cyano benzyl, o-cyano benzyl, a 1-hydroxy-2-phenyl isopropyl machine, a 1-chloro-2-phenyl isopropyl machine, etc. are mentioned.

[0029] The aryloxy group which is not replaced [ substitution or ] is expressed as -OZ. as Z A phenyl group, 1-naphthyl group, 2-naphthyl group, 1-anthryl machine, 2-anthryl machine, 9-anthryl machine, 1-phenan tolyl group, 2-phenan tolyl group, 3-phenan tolyl group, 4-phenan tolyl group, 9-phenan tolyl group, 1-naphtha SENIRU machine, 2-naphtha SENIRU machine, 9-naphtha SENIRU machine, 1-pyrenyl machine, 2-pyrenyl machine, 4-pyrenyl machine, 2-biphenylyl machine, 3-biphenylyl machine, 4-biphenylyl machine, a p-terphenyl-4-IRU machine, a p-terphenyl-3-IRU machine, A p-terphenyl-2-IRU machine, an m-terphenyl-4-IRU machine, an m-terphenyl-3-IRU machine,

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